

User Manual



etalux®- Lighting System



This manual was published by:

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The material in this manual is believed adequate and correct for the intended use of the **etalux**® Lighting System. However, it may be changed or updated at any time without prior notice. If the product or its individual modules are used for purposes or in ways other than those specified herein, confirmation of suitability must be obtained.

This manual gives detailed technical information about our *etalux*® lighting system and a brief general guidance on matters of lighting.

Please read the complete operation manual and follow the given information carefully as it contains important details for the correct operation. Keep the manual for future reference.

Failure to do so shall void any warranty, stated or implied. For any damage caused by failure to follow the safety instructions, improper handling or use which is not specified in this manual we assume no liability!



A triangle points to important instructions in the manual which must be respected.



Within the framework of the conformity assessment, we declare that our *etalux*® 1500 Lighting System or *etalux*® 1200 Lighting System is in conformity with the provisions of the following EC directives:

- EC Low Voltage Directive 73/23/EEC
- EMC Directive 89/336/EEC & 92/31/EEC
- CE marking Directive 93/68/EEC



We also declare that its use may in consistence with the required high level of protection for the health and safety of persons cause no or only minor risks - EU Directive 2001/95/EC (see also paragraph 2.16).

If any of our products is operated in a non-approved lamp, we assume no guarantee of compliance with the EMC regulations. If in such a case the limits are not met, the responsibility to meet the limits rests entirely with the operator. Furthermore we exclude any liability and we are particularly not liable for problems caused through operating the device in non-compliance with the related EMC regulations.



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The ***etalux*®** Lighting System in its entirety as well as in its individual components is protected by worldwide patent and copyright!

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1	General	5
1.1	Why shall we use electronic ballast for fluorescent tubes	5
1.2	EEI-Classification – CELMA-System for the classification of energy efficiency	5
1.3	Protection Rating	6
1.4	T5 – Luminaries for the future.....	7
1.5	The light color of fluorescent tubes - 3 digits indicate the color of fluorescent lamps.....	8
1.6	etalux® - Reflectors to improve lighting intensity	9
1.7	etalux® - Intelligent technology included.....	9
2	Installation and Operation	10
2.1	Intended Use	10
2.2	Approved T5 tubes.....	11
2.3	RCD (residual-current-operated protective device)	11
2.4	Configuration of automatic circuit breakers	12
2.5	Power factor and its compensation - harmonics.....	12
2.6	Interference with control systems using infrared or other electromagnetic signaling.....	12
2.7	Dimming	13
2.8	Ambient temperature and etalux® system temperature	13
2.9	etalux® for external lighting	13
2.10	Life span and reliability of the etalux®	13
2.11	End-of-Life cut off	13
2.12	Automatic restart function of the lamp in case of a „hot“ exchange; i.e. change of the tube while the lamp is switched on.	14
2.13	The lamp stays dark – no starting	14
2.14	Illumination quality.....	14
2.15	economical operation.....	14
2.16	Certified safety and reliability	14
2.17	Temperature, durability und ignition behaviour.....	15
2.18	How to estimate the potential savings	15
2.19	Requirement to the electric setup of your lamps.....	17
2.20	Vertical installation	17
2.21	Exchange of the T5 tube in your etalux® Lighting System	17
2.22	Exchange of the etalux® bridge (fused bridge)	18
2.23	Replacement of the etalux® electronic part.....	19
2.24	etalux® Lighting System in continuous operation (24/7 operation).....	19
2.25	Variation of brightness between different lamps	19
3	Installation and safety advice.....	20
3.1	To do's prior to installation of the etalux® Lighting System	20
3.2	Contents of delivery	21
3.3	Unpacking	22
3.4	Installation of you etalux® Lighting System	22
3.5	Cleaning.....	24
3.6	Technical date for approved operation (data sheet)	24
3.7	Disposal and recycling	25
3.8	Customer Service.....	25
3.9	Warranty policy.....	25

etalux® – intelligent technology included

- etalux®** – the revolutionary energy saving solution for T8- and T12- generation light fixtures with a standard length of 1,200mm and 1,500mm.
- etalux®** – is a new generation electronic ballast driven lighting system using a T5- fluorescent tube encased in a clear protection tube. It is energy efficient and compact.
- etalux®** – can be used in a vast variety of applications, in dusty, damp or moisture encumbered areas as well as in areas which need shatter- proof light fixtures.
- etalux®** – may be used for primary installation as well as a retrofit.
- etalux®** – the innovative design allows a time and cost saving replacement.
- etalux®** – generates approx. 48% in energy savings after installation.¹
- etalux®** – provides a two to threefold longer lamp life due to the use of T5- tubes vs. conventional T8 tube.
- etalux®** – can be used in light fixtures which use conventional ballast, improved conventional ballast or any derivatives without having to remove them.
- etalux®** – provides “plug and save” technology. No alteration is necessary which would interfere with the given light fixture. Just change the tube and replace the starter.²
- etalux®** – complies with all relevant European specifications in regards to design, functionality, safety and EMC.
- etalux®** – uses an advanced integrated circuit (IC) which features a tube saving start behaviour and a sophisticated surveillance to provide a prolonged T5- tube life.
- etalux®** – has an overcurrent limiter and recognizes via a Power Factor Corrector any overcurrent, undercurrent or an open control circuit.
- etalux®** – interrupts the power input immediately once it has detected that the tube was removed or destroyed.
- etalux®** – constantly surveys the T5- tubes status and switches it off in case of overvoltage and when detecting a system status which could destroy the tube (For instance thermal instability or reaching the end of life / EoL Detection).
- etalux®** – A restart will be initiated as soon as the lamp circuit is switched off and on. However, in case of an overheat condition, a cool down phase may have to be observed.
- etalux®** – improves the tube’s life cycle through a warm start which preheats the tube’s cathodes.
- etalux®** – UV resistant long life sheath tube stabilizes and optimises the T5- tube’s temperature for a higher light efficiency – in particular in a non favourable installation like in the outside or in a low temperature environment.

¹ Compared to a 58 Watt T8 fluorescent tube with conventional ballast (approx. 34 % with improved ballast)

² applicable for an installation not yet equipped with an electronic ballast (With electronic ballast see further instructions)

1 General

1.1 Why shall we use electronic ballast for fluorescent tubes

The operation of a fluorescent lamp requires a ballast, which in conjunction with the starter provides the high voltage required starting the lamp and afterwards balances the current during normal operation.

Balancing the current is of vital importance for the operational life time of the lamp as well as this is the case with the starting conditions in regards to the pre- heating of the cathodes and ignition current. Unfavourable starting conditions typically damage the cathodes and reduce the lamps life time.

The electronic ballasts from e-Ressource are designed for a normal power supply as outlined in the list of technical data but operate the lamp at a distinctively higher frequency than the supplying net's frequency (typically 50Hz). When switched on, the electronic ballast generates the necessary high voltage to ignite the lamp which makes the starter obsolete. Also any form of reactive (wattless) current or power factor correction becomes obsolete as the power factor is typically better than $\lambda > 0.95$

A fluorescent tube driven through an electronic ballast conserves less energy as a conventional system due to two main reasons: First the loss in the electronic circuits is much less than the energy lost through the conventional inductive system. The internal loss is approximately just 8 to 10% of the systems consumed energy. Second a given luminous flux requires a lower energy input when controlled through an electronic ballast. Due to modern technology the power consumption of an **etalux**® will be kept at a constant level even during power surges.

1.2 EEI-Classification – CELMA-System for the classification of energy efficiency

To compare the power consumption of a ballast-lamp circuit for fluorescent lamps, a standard for measuring the total input power of ballast-lamp circuits was developed by CENELEC, the European Committee for Electrotechnical Standardization. The Federation of National Manufacturers Associations for Luminaries and Electronical Components (CELMA) has introduced a classification of ballast and lamp circuits (EEI = Energy Efficiency index).

According to this classification the total input power of ballast-lamp circuits is divided into 7 classes. The EEI classes are shown in the following table. These are the classes A1, A2 and A3 for electronic ballasts (A1 dimmable), the classes B1 and B2 for low loss electromagnetic ballasts and the classes C and D for conventional electromagnetic ballasts.

The 7 EEI classes in regards to a T8 (T26) / 36 W fluorescent tube lamp:

Class	Specification	Input Power
D	conventional high loss electromagnetic ballast	> 45 W
C	conventional electromagnetic ballast	≤ 45 W
B2	low loss electromagnetic ballasts	≤ 43 W
B1	low loss electromagnetic ballasts	≤ 41 W
A3	electronic ballasts	≤ 38 W
A2	electronic ballasts	≤ 36 W
A1	dimmable electronic ballasts	≤ 38/19 W (100 % down to 25 %)

Because of European commitments to reduce greenhouse gases (World Climate Change Conference) the European directive 2000/55/EC was adopted. This new directive on energy efficiency requirements stipulates that from 21.05.2002 Class D ballasts and 21.11.2005 Class C ballasts are no longer allowed to be distributed in the European market (EU).

To implement the agreed reduction of CO₂ and other greenhouse gases, the European Directive 2000/55/EC was adopted by the EU, which on 21.11.2000 became binding law. On 21.05.2002 the first stage of the directives ban (banishment of the magnetic ballasts EEI = D) came into force; i.e. from that date on, only ballasts which would meet the CELMA EEI classification A1, A2, A3, B1, B2 and C are allowed to be sold in the EU market.

From 21.11.2005 the second stage came into force which would ban all ballasts with an EEI classification Class C from being marketed.

Exclusion dates according to EU Directive 2000/55/EC

Stage I:	Class D	banned since 21.05.2002
Stage II:	Class C	banned since 21.11.2005
Stage III:	Class B2	no limitation
	Class B1	no limitation
	Classes A1, A2 and A3	no limitation

The **etalux**[®] Lighting System fulfils the requirements of Stage III (EII Class 2 / see 3.6).

1.3 Protection Rating

The IP Code (or International Protection Rating, sometimes also interpreted as Ingress Protection Rating) consists of the letters *IP* followed by two digits and an optional letter. As defined in international standard IEC 60529, it classifies the degree of protection provided against the intrusion of solid objects (including body parts like hands and fingers), dust, accidental contact, and water in electrical enclosures. The standard aims to provide users with more detailed information than vague marketing terms such as "waterproof". The digits ('characteristic numerals') indicate conformity with the conditions summarized in the tables below. Where there is no protection rating with regard to one of the criteria, the digit is replaced with the letter X.

The first digit indicates the level of protection that the enclosure provides against access to hazardous parts (e.g., electrical conductors, moving parts) and the ingress of solid foreign objects.

The second digit indicates protection of the equipment inside the enclosure against harmful ingress of water.

Code	<u>1st digit</u> 2 nd digit	<u>Object size</u> Protected against	<u>Effective against</u> details
IP20	IP2...	Protected against solid objects	Fingers or similar objects up to 80 mm in length, object larger than Ø12 mm
	IP...0	Not protected	No protection against contact and ingress of objects
IP...1	1	dripping water	Dripping water (vertically falling drops) shall have no harmful effect.
IP...3	3	spraying water	Water falling as a spray at any angle up to 60° from the vertical shall have no harmful effect.
IP...4	4	splashing water	Water splashing against the enclosure from any direction shall have no harmful effect.
IP...5	5	water jets	Water projected by a nozzle against enclosure from

			any direction shall have no harmful effects.
IP...7	7	immersion up to 1 m	Ingress of water in harmful quantity shall not be possible when the enclosure is immersed in water under defined conditions of pressure and time (up to 1 m of submersion).
IP...8	8	immersion beyond 1 m	The equipment is suitable for continuous immersion in water under conditions which shall be specified by the manufacturer. NOTE: Normally, this will mean that the equipment is hermetically sealed. However, with certain types of equipment, it can mean that water can enter but only in such a manner that produces no harmful effects.
IP4...	4	>1 mm	Most wires, screws, etc.
IP5...	5	dust protected	Ingress of dust is not entirely prevented, but it must not enter in sufficient quantity to interfere with the satisfactory operation of the equipment; complete protection against contact
IP6...	6	dust tight	No ingress of dust; complete protection against contact

Note

The protection specifications relate to non- customized standard housings as supplied. Since the tests do not account for any aging, it is not ensured that the protection level will be maintained over the equipments entire lifespan.

The **etalux**® Lighting System is rated IP 54 (see also 3.6).

1.4 T5 – Luminaries for the future

Even in the "light-bulb" industry there is continuous development. The T5- tubes and lighting systems are a completely new generation of lamps. The "slim line" of only 16 millimetres in diameter is the most noticeable characteristic feature of the latest generation of bar-shaped fluorescent lamps. The new, thin and straight fluorescent lamps produce the most energy-efficient lighting we presently can use.

Fluorescent lamps with 16mm in diameter are available in two varieties. Lamps with "high luminous efficiency" (HE = High Efficiency) are designed for maximum efficiency: to the highest luminous flux (in lumens, lm) per lamp power (in watts, W). However, regardless of the rating, all tubes of this series have the same luminance.

Lamps with "high flux" (HO = High Output) are designed for maximum luminous flux per lamp length with traded against a reduced efficiency of approx. ten percent but a significantly improved luminance. VHO lamps (Very High Output) complement the current series.



Please keep in mind: The *etalux*® lighting system is designed to operate with HE fluorescent lamps; T5 HO tubes and other T5 series available on the market are not yet suitable for the *etalux*® lighting system!

All versions of the T5- lamp (HE or HO) must be operate with an electronic ballast. This way they burn very energy efficient and generate a high luminous flux at low power consumption. The luminous flux reaches over 100 lm/W.

The lifetime of the T5- tube spans on average 24,000 hours of operation. Over this period, the total flux is largely preserved through an improved phosphors and coating process.

The T5- fluorescent tube reaches its maximum luminous flux at 35 degrees Celsius (25 degrees Celsius for 26mm (i.e. T8) tubes). Thus, they are optimally designed for the ambient temperature reached in many applications.

Since the length of the T5 does not match the length of the T8/T12 tubes, a change or redesign of the lamps installed would be required. **With our *etalux*® Lighting System you will switch to this new generation lamp without having to go through a cost-intensive, completely new installation!**

1.5 The light color of fluorescent tubes - 3 digits indicate the color of fluorescent lamps

The light colour describes the colour appearance of a lamp's light. The light colour is characterized by the colour temperature in Kelvin (K):

Different lamps' light of apparently the same colour can have different colour characteristics. The light's colours affect the room atmosphere: warm light feels cosy and comfortable, neutral white light creates a more reserved atmosphere. For an indoor application daylight should be used only from a luminous intensity of 1,000 Lux and up; otherwise at a lower illumination level the light creates a pale and boring atmosphere.

Linear fluorescent and compact fluorescent lamps are available in a variety of light colours. The difference in manufacturer light colour is internationally identified through a sequence of digits, for example "840".

The first digit of this code provides information on the colour status of the lamp, i.e. the colour reproduction, which is expressed through the colour reproduction index R_a :

- At $R_a = 100$, all surrounding colours appear natural. A number of "9" stands for the best colour in the R_a range between 90 and 100. Fluorescent lamps bearing the suffix "de luxe" reach this value.
- Most fluorescent lamps and compact fluorescent lamps bear a R_a value of "8" which stands for a R_a range from 80 to 89 and represents a good colour reproduction.

The second and third digit of the code stands for the colour temperature (in K = Kelvin) about the actual light colour:

Warm white	(ww)	< 3.300 K
Neutral white	(nw)	3.300 K to 5.300 K
True white	(tw)	> 5.300 K

The first two digits of the Kelvin value are used for coding the light colour. For example:

27	equivalent to light bulbs (2.700 K),
30	warm white (3.000 K),
40	neutral white (4.000 K),
65	daylight (6.500 K).

Even under the regulation for non- private applications, many alternatives and options are available when deciding on the light colour. With the exception that in most cases at least a R_a of "8" is required for the light colour, there is in general no "right solution". The choice of colour depends crucially on interior design, intended atmosphere and personal taste. Even the geographical location also plays a role: In the north warm light colours are preferred, in the south a "colder" light is typically more popular.



When there is more than one light source in use in one room, pay attention to a uniform light colour, as especially the reflecting from objects on walls, ceilings and floors has quite different visible effects on the lighting. Our customers typically use the light colour 840, partly 865.

T5 fluorescent lamps will reach their full brightness after approximately 100 hours of burning. While still new, they do not operate at an optimum gas distribution and ionization. However, this will improve rapidly throughout the “burn in” phase.

1.6 etalux® - Reflectors to improve lighting intensity

An adequate reflection and guidance of light can eventually improve the light intensity by up to 100%; one way to take considerable advantage of this fact is by using our **etalux®** reflectors.



How is this possible?

A fluorescent tube obviously radiates light over a full circle. Through reflecting the light which goes up down into the area where needed will increase the light intensity significantly.¹

1.7 etalux® - Intelligent technology included

The **etalux®** Lighting System complies with the applicable national and international industrial standards. (i.e. EN 61347, EN 1347-2-3)

End-of-life shutdown (EOL)

According to the European Standard EN 60928, an electronic ballast must shut down within 5 sec whenever one of the following malfunctions occurs:

- no lamp installed
- lamp does not start as at least one cathode is broken
- despite two operating cathodes the lamp does not start, e.g. the tube leaks ...
- unsymmetrical operation

Close to the end of its life cycle the lamp may start to act atypical. It may come to a so called unsymmetrical burning which basically overloads the tube and ends in an overheating of the cathodes and a potential melt down.

The **etalux®** system includes an end-of-life detection; thus **etalux®** will shut down the lamp when closing in on the end of the life cycle.

Safety and operation:

EN 61000-3-2 (AC power harmonic content): The **etalux®** behaves on the network as an ideal (ohmic) resistance. It does not load the electric network with reactive (wattless) power, for which in many networks the customer would have to pay for.

¹ **etalux®** reflector are available either direct from us or through our sales representative. All relevant information can be found under: www.e-ressource.eu.

EN 55015 (radio interference): In high-frequency operation, the electronic ballast could generate interferences between 9 kHz and 30 MHz and possibly affect other electronic devices. However, **etalux®** meets the required standards quite comfortably.

Immunity: The Electronic ballast must be protected against external disturbances such as high-energy pulses (so-called surge pulse) or fast and low energy pulses (known as transient pulses). These pulses occur as a disturbance on the network, caused for example by production machinery, refrigerators, TV sets or conventional ballasts, etc. The intensity of the surge pulses is typically around 1kV symmetrically or asymmetrically 2KV. The **etalux®** is adequately protected and will not suffer any damage from these pulses. However, there is no protection from very high energy loads such as lightning strikes.

2 Installation and Operation

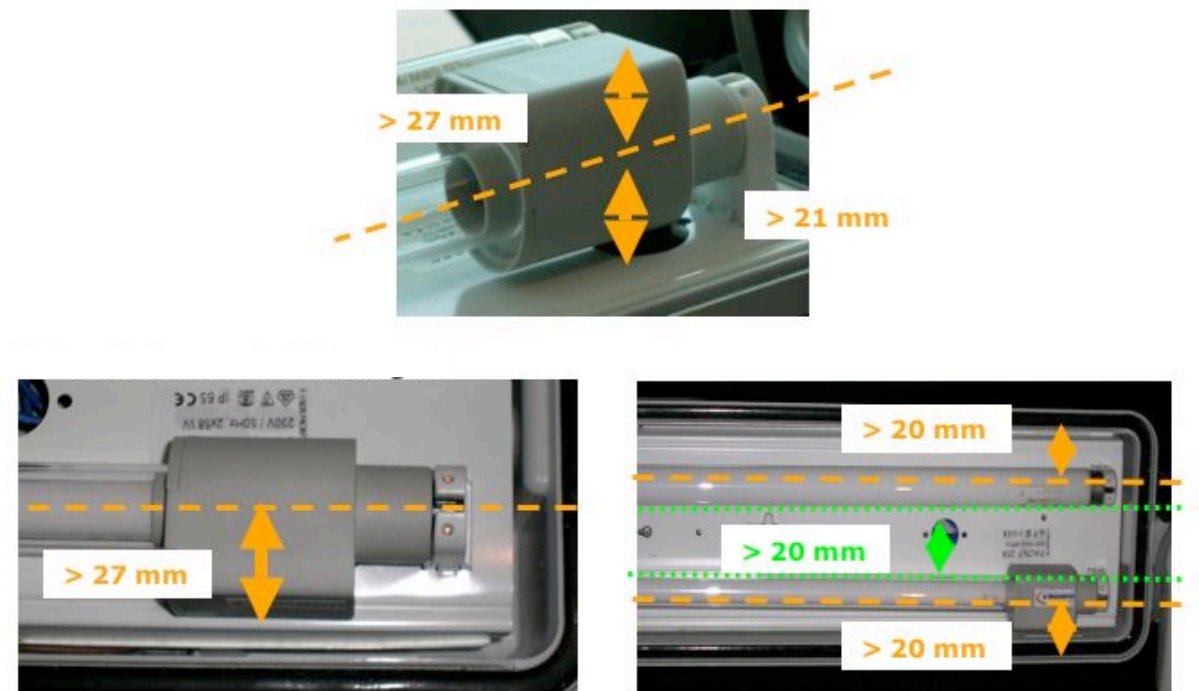
2.1 Intended Use



The **etalux®** system ...

- ... **must be installed as outlined in this manual. Any direct contact with the electronic components must be avoided.**
- ... **can be used with direct as well as alternate current (see 3.6).**
- ... **starts the T5- tube very cautiously to extend the lamps life span.**
- ... **is not dimmable.**
- ... **is designed for an ambient temperature as outline in the data sheet (see 3.6). Any deviation may cause a malfunction of the system or eventually destroy it.**
- ... **may be used in an environment which meets the IP classification as given in the data sheet. Any other use is prohibited as it may cause failure and/or damage like short circuit, fire, electric shock or else.**
- ... **may soften but does not avoid the detrimental effect that frequent switching has on the tubes life span.**
- ... **shall not be altered or modified.**
- ... **is available in two different versions for 1,200 mm T5 tubes and 1,500 mm T5- tube.**
- ... **can be used without further modification only in fixtures equipped with either a conventional electromagnetic ballast of the EEI Classes C and D (see Chapter 1.2). In case of a low loss electromagnetic ballast being installed (EEI Classes B1 or B2) it may only be possible to use the **etalux®** after the installation of a conversion kit. Please contact us for further details prior installation!**
- ... **can be used with a lamp already equipped with an electronic ballast only after bypassing or removing this original ballast.**
- ... **can be operated without a conventional ballast or a bridged electronic ballast. However, this may require the adaptation (strengthening) of an installed RCD (residual-current-operated protective device).**
- ... **must not be used with a previously installed power factor correction built into the lamp as an overcorrection would occur.**
- ... **may only be used in lamps equipped with G13 contacts (i.e. for T8 and T12 tubes) and where the lateral axis of the fluorescent tube provides a clearance of at least 21 mm to the lamp housing. The housing must provide a horizontal clearance of 20 mm to either side of the tube's axis**

and a vertical clearance of 27 mm in direction of the main lighting. Further restrictions may apply due to the shape of the housing.



Please contact us in case of doubt prior installation!

Keep in mind that all safety instructions for the installation and operation of electrical equipment have to be observed at all times!

2.2 Approved T5 tubes

Due to different ignition voltages (and lamp voltage during preheating of the cathodes), not all T5-tubes from different manufactures may work properly with the **etalux**® Lighting System. In regards to the environmental requirements and operating ranges as outlined in the data sheet (see 2.6), we have demonstrated that the following T5 tubes will work satisfactory with the system:

Manufacturer	35 Watt (1,500mm)	28 Watt (1,200 mm)
Sylvania	Luxline Plus FHE 35 Watt	Luxline Plus FHE 28 Watt
Philips	Master TL5 HE 35 Watt	Master TL5 HE 28 Watt
Aura	FH 35 Watt	
Narva		FH 28 Watt
Osram	Lumilux HE 35 Watt	Lumilux HE 28 Watt

Additional approved types can be found on our website (www.e-ressource.eu). Should you have a specific, not listed brand/type you would like to use we are happy to assist you concerning its compatibility with the **etalux**® Lighting System.

2.3 RCD (residual-current-operated protective device)

According to our investigation there are no known effects of the **etalux**® Lighting System on any kind of installed RCDs.

2.4 Configuration of automatic circuit breakers

Due to manufacturing tolerances built into the conventional electromagnetic ballasts, a greater number of lamps will start with a different time lag. With the use of electronic ballasts, all lamps will start within a much closer time interval. Thus it is possible that the peak starting current will exceed the peak known from the original installation and may trigger the circuit breaker.

As a consequence, the maximum number of lamps per circuit breaker has to be reduced. With a 10 Amp automate the number of lamps has to be reduced from 15 lamps with twin tubes (i.e. 15x 2x58W) to 8 lamps with electronic ballast.

2.5 Power factor and its compensation - harmonics

For an electric load, the power factor λ is the ratio between effective power and apparent power. Typically it is very close (assumed that there is not too much distortion on the net) to the cosine φ between voltage and current which indicates the phase shift. Unlike a conventional ballast (inductive, 50 Hz), a lamp with an electronic ballast experiences almost no phase shift (cosine $\varphi > = 0.95$) thus no power factor compensation is required.

However, an electronic ballast generates a significant amount of harmonic frequencies which may pollute the supplying network. The harmonic content is strongly limited by international regulations (IEC 61000-3-2).

The **etalux**[®] Lighting System uses built in active harmonic filters which guarantee the compliance with the appropriate limitations.

2.6 Interference with control systems using infrared or other electromagnetic signaling

Fluorescent lamps emit light in a wavelength which is sometimes used for infrared transmission. As some of these infrared receivers are not very selective, a disturbance of existing equipment may occur. You may find the active frequencies of the **etalux**[®] Lighting System in the data sheet (see 2.6). The fluorescent tube's light is modulated at twice the frequency than the operating frequency of the ballast. Disruption may occur with devices operating in the same frequency range.

IR remote control:

System using a sufficiently high carrier frequency (400...1,500 kHz) will not be disturbed.

Sound transmission systems:

These systems typically used frequencies of 95 kHz and higher with the effect that the harmonics (20...120 kHz during normal operation) generated by electronic ballasts used to create a significant disturbance of the sound transmission. The solution was usually found through the use of higher frequencies; e.g. 2.3 MHz u. 2.8 MHz.

For the operation of simultaneous transmission systems it is recommended not to use the first 6 of the total of 32 channels. As these first six channels also work in the frequency range from 95 kHz to 250 kHz, disturbances in the transmission can be expected.

High frequency remote control systems:

These systems typically use carrier frequencies around 120 kHz. Components for radio interference suppression as built into many electronic devices like electronic ballasts, may disturb the transmission.

Call systems:

Most systems operate in the MHz range. Inductive systems use 25 to 40 kHz; thus a reliable performance cannot be expected.

Anti- theft systems (Department stores, malls):

Many department stores use electronic anti- theft systems to protect their merchandise. These systems typically operate with a resonance frequency in the kHz range. Under less favourable conditions, interferences may occur when the frequency of the systems lies between 30 kHz and 150 kHz. These may be eliminated through increasing the distance between the systems antennas and the lamps or by using lamps equipped with a metallic grid/cover.

2.7 Dimming

It is not possible to dim lamps equipped with the **etalux**® Light System.

2.8 Ambient temperature and **etalux**® system temperature

The temperatures as given in the data sheet shall not be exceeded (see 3.6). Generally speaking a lower ambient temperature will stretch the **etalux** life cycle. For the installation of the **etalux**® Light System, the surface temperature of the electronic T_c is governing. The maximum temperature as given in the data sheet may not be exceeded.

2.9 **etalux**® for external lighting

When using electronic ballasts for the operation of T5- fluorescent lamps in outdoor lighting it is important to note that the electronic ballasts, depending on the lamp, may be exposed to the effects of moisture.

The operational range for the use of a lamp is typically defined by its protection rating (IP ... - see housing protection rating paragraph 1.3) rather than the protection rating of the electronic ballast.

However the protection rating of the **etalux**® Lighting System, can be found in the data sheet (see 3.6).

2.10 Life span and reliability of the **etalux**®

The failure rate of electronic components does not just depend on the specifications of its components and the components' quality, but very much on the operating temperature. The **etalux**® Lighting System is designed not to exceed a failure rate of 2 per mille per 1,000 hours of operation when operated up to the maximum allowed temperature (T_c max.). This corresponds to an expected life time of 50,000 hours at a final failure rate of less than 10%.

2.11 End-of-Life cut off

The fluorescent tube typically reaches the end of its life time when the cathodes' emitters is/are exhausted. The loss of the emitter raises the potential in the immediate vicinity of the electrode which may lead to a melt down of the tube's end. As this situation progresses slowly it is relatively easy to detect. The cathode is not affected by the tube's aging, and aging can be detected through the lamps increasing potential difference between its two ends.

Modern electronic ballasts detect this state and turn off the lamp through their end-of-life cut off function. Further, an interruption function prevents unnecessary later starting of the lamp and avoids a potential overheating.

The **etalux® Lighting System features this EOL safety shutdown which also interrupts the power supply in case of other failures of the tube or in case no tube is installed.**

2.12 Automatic restart function of the lamp in case of a „hot“ exchange; i.e. change of the tube while the lamp is switched on.

The **etalux**[®] Lighting System is programmed to restart the lamp in case the tube was changed while the lamp was still under power supply. Thus, theoretically not all other lights must be turned off, while servicing the parts of the installed lighting system takes place – however, this is not recommended for safety reasons.

2.13 The lamp stays dark – no starting

The **etalux**[®] Lighting System continuously monitors certain operating conditions off the lamp and switches it off in case critical operating conditions are detected; e.g. current peaks in the lamp supplying network. However, **etalux**[®] Lighting System will restart the lamp as soon as the operating conditions are safe again.

A failure to restart the lamp could be caused by:

- A failed light tube
- Destruction of the safety fuse located in the bridge of the **etalux**[®] Light System
- The **etalux**[®] Light System has a malfunction

As a first rectification the fluorescent tube¹ shall be exchanged and the power supply cycled. Should the lamp still not start, replace the bridge². Should this not be satisfactory, then the entire **etalux**[®] Lighting System³ must be replaced.

2.14 Illumination quality

The **etalux**[®] Lighting System optimises your lighting quality:

- ... flicker- free start
- ... comfortable non- tiring lighting due to high frequency operation of the tube
- ... no stroboscope effect
- ... no 50Hz/60Hz humming due to the electronic ballast
- ... no flickering when reaching the end of life as the electronic will cut off the power

2.15 economical operation

The **etalux**[®] Lighting System provides ...

- ... significant savings on your energy bill after having replaced the old conventional electromagnetic ballast through the electronic ballast.
- ... improved light efficiency after using T5 FH High Efficiency fluorescent tubes which means saving on your energy bill as well.
- ... an improved life span of the fluorescent tubes due to the pre- heating of both cathodes.

2.16 Certified safety and reliability

Crucial for the marketing and operation of electronic ballasts are EU standards. The **etalux**[®] Lighting System complies with the relevant European laws, guidelines and standards, and received its

¹ Light tubes may be ordered directly from us **www.e-ressource.eu**, our sales representatives (see the contacts under **www.e-ressource.eu**) or from any electronic supplies store.

² New bridges you may order directly from us as well or via our sales representatives.

³ The **etalux**[®] Light System may be ordered directly from us **www.e-ressource.eu** or our sales representatives (see the contacts under **www.e-ressource.eu**)

general certification through TÜV Rheinland Product Safety GmbH in November 2007 [Prüfbericht Nr. 21132596_002 vom 28.11.2007 zur Konformität im Rahmen des Gesetzes über technische Arbeitsmittel und Verbraucherprodukte (Geräte- und Produktsicherheitsgesetz – GPSG) sowie Prüfbericht Nr. 21133340_001 des TÜV Rheinland vom 31.10.2007 im Rahmen der EM-Zertifizierung / i.e. German certification reports]. The relevant test reports are available on our website www.e-ressource.eu.

2.17 Temperature, durability und ignition behaviour

The failure rate of electronic components does not just depend on the specifications of its components and the components' quality but very much on the operating temperature. The **etalux**® Lighting System is designed to reach its average life time still when operated up to the maximum allowed temperature (Tc max.).

Extreme overheating can destroy electronic components quite rapidly. As the failure rates of many electronic components show an exponential dependency with increasing temperatures, lower ambient temperatures support the anticipated life span of the **etalux**® Light System.

The ballast's immanent temperature derives from a combination of internal power dissipation, heat radiated from the tubes ends and ambient temperature. Thus, it is always higher than the ambient temperature itself.

Due to the relatively low power dissipation of the **etalux**® Lighting System, its immanent heating is relatively low. Typically, the surface temperature will rise by 10°C to 20°C above ambient temperature.

When the **etalux**® Lighting System is operated outside its approved temperature range, the following malfunctions may occur:

Too low ambient temperature:

The tube start is unreliable. Low temperatures may alter the physical behaviour of some components to an extent that indifferent malfunctions may occur. This may lead to an irreparable damage of the electronics. Whenever the tube starts, the sheath tube insulates the light tube in a way that a significant reduction of the lighting intensity should not occur. However, a very light red shift may be observed.

Too high ambient temperature:

High ambient temperatures reduce the electronics ballasts life span eventually significantly up to its destruction. Exceeding the given temperature range even just lightly will reduce the electronics ballasts life span significantly.

Exceeding the ambient temperature limit by 10°C will reduce the live span by approx. 50%, where as a 10°C reduced ambient temperature may double the life expectancy.

2.18 How to estimate the potential savings

As electricity rates rise constantly, lighting becomes an increasingly significant cost factor. So it is important to understand, where the potential savings of up to 48% (old installation vs. **etalux**®) come from.

The savings are generated from two main aspects:

- (1) Savings due to the difference in the lighting system's efficiency
- (2) Savings due to the difference in useable life span of T8 vs. T5 tubes

(1) Savings due to the difference in the lighting system's efficiency

The systems power input (Watt) is a combination of lamp power input (fluorescent tube) and ballast power dissipation (power loss in the electronic ballast).

According to a publication from the Hessian Ministry for Economy / Germany (Source: Broschüre Gutes Lichtklima – Ratgeber zur energieeffizienten Beleuchtungsmodernisierung des Hess. Ministeriums für Wirtschaft, Verkehr und Landesentwicklung, revised edition January 2005) the system power input for different ballasts can be estimated as follows:

Standard T8 fluorescent tube (58 Watt) / conventional electromagnetic ballast:	71 Watt
Standard T8 fluorescent tube (58 Watt) / low loss electromagnetic ballast:	66 Watt
Standard T8 fluorescent tube (58 Watt) / electronic ballast:	55 Watt

T5 fluorescent tube (Sylvania Luxline Plus FHE/35 W) / electronic ballast: **39 Watt**

The T5's potential savings in regards to ...

- ... a standard T8/58W tube with a conventional electromagnetic ballast is ... 45 %
- ... a standard T8/58W tube with a low loss electromagnetic ballast is ... 40 %

(2) Savings due to the difference in useable life span of T8 vs. T5 tubes

Steadily and increasing with life time, the installed lighting intensity decreases due to aging and pollution. When planning the illumination of a workplace, or a similar maintenance plan; it has to be developed according to DIN EN 12464-1, which among others must contain maintenance intervals for the exchange of lamps and their cleaning.

The useable life cycle for fluorescent lamps amounts up to approximately:

T5- fluorescent tube	16,000 hours
Standard T8- fluorescent tube	7,500 hours

(Austrian Association for saving energy: Innovative Beleuchtung – Technologien und Lösungen für Büros und andere Dienstleistungsgebäude des o.ö. Energiesparverbandes - www.esv.or.at/esv/)

Example for the calculation (simplified)

Burning period per lamp p.a. (12h/day, 335 days p.a.):	4.020 hrs
Direct labour costs:	25.00 EUR/h ¹
Time frame for maintenance (exchange + cleaning):	15 min.
Costs for T8 / T5- tube incl. disposal:	2.50 EUR/pc.
Assumed life cycle for the electronic ballast:	50,000 hrs of operation

Saving potential per T5 life cycle ... 8.75 EUR per lamp

- ... 2.50 EUR as with T8 the tube needs to be changed more often
- ... 6.25 EUR reduced labour costs for the exchange

Saving potential per life cycle of the electronic ballast ... 26.25 EUR per lamp

- ... 3x less exchanges of the tube

Saving potential per year ... 2.20 EUR per lamp

NOTE: Please bear in mind that the calculations are based on assumed values extracted from relevant literature for which we cannot guarantee. The actual input power of the **etalux**® Lighting System can be found in the data sheet (see 3.6).

¹ Please notice, that the need for a lifting platform or something similar, as well as waiting times during the production in progress may significantly increase the total maintenance costs.

The individual savings in electricity and maintenance cost may vary widely as due to the individual circumstances that actual values may vary considerably from the above values and assumptions. We will be glad to use our **etalux**[®] savings calculator to provide you with an estimate on your individual savings. Please contact us or one of our representatives (available at www.e-ressource.eu).

2.19 Requirement to the electric setup of your lamps

The **etalux**[®] Lighting System cannot be used in all installations, even though your lamps operate with conventional electromagnetic ballasts and starters.

Typically, two cases are very particular, in which the use of the **etalux**[®] Lighting System would not be possible without a conversion prior to installation:

1. A single electromagnetic ballast supplies two fluorescent light tubes arranged in series. In this case the light tubes' rated voltage is half of the supplying network's voltage; in Europe typically from 220V down to 110V. Thus, there is no conversion possible.
2. One lamp bears two parallel installed fluorescent tubes along with their own ballast and starter. However, one of the lamps is installed in line with a condenser. This is done to improve the power factor and to suppress the stroboscope effect of a single lamp. This condenser must be removed prior to the installation of the **etalux**[®] Lighting System.

2.20 Vertical installation

The **etalux**[®] Lighting System can be installed in almost any orientation. However, whenever installed vertically, the electronic part has to point downwards so the stamp on the tube points downwards as well.

2.21 Exchange of the T5 tube in your **etalux**[®] Lighting System

Remove the **etalux**[®] Lighting System from the lamp and perform the exchange of the tube at a secure, dry and dust free location (see also 3.4. Installation).



>Bild 1<



>Bild 2<



>Bild 3<



>Bild 4<

- Picture 1: Open the housing by cautiously pressing the two locks inwards. Pull the sheath tube with its top plate straight out of the housing.
- Picture 2: Cautiously remove the housing so that you have free access to the T5-tube.
- Picture 3: Hold the T5- tube firmly on its contacts or the metal cap and remove it from the sheath tube.
Insert a new tube (keep in mind the light colour – see 1.5)¹. Arrange the orientation of the tube so that the labelling faces the electronic side of the lamp (the boxed end). Lock the contacts at the far end into its mount with a small twist and a cautious push.
- Picture 4: Reassemble the sheath tube, T5- tube and electronics by cautiously setting the housing onto the sheath tube's end plate. Keep the two contacts in mind, which have to slide into the little "finger" on the end plate.



When exchanging the T5- tube, its labelling (stamp) always has to face the electronic housing (= the thick end).

2.22 Exchange of the *etalux*® bridge (fused bridge)

Remove the *etalux*® Lighting System from the lamp (see also 3.4. Installation) and exchange the bridge.



This can be done with the help of a coin, a regular straight screw driver or a ¼" square blade screw driver.

¹ Light tubes may be ordered directly from us www.e-ressource.eu, our sales representatives (see the contacts under www.e-ressource.eu) or from any electronic supplies store.



The bridge contains a non- replaceable fuse (Specifications according 3.6 of the data sheet), which protects the electronics and the lamp from undue high current and possibly fatal operational parameters.¹

WARNING: Never use conventional or electronic starters with the *etalux*® Lighting System!

2.23 Replacement of the *etalux*® electronic part

Should a failure occur in the *etalux*® electronics which is not covered by our warranty policy, it is still possible to simply replace the electronic box itself. This replacement is more cost efficient than the replacement of the entire system. Please contact us or one of our sales representatives.



Should you intend to replace the electronic box, please send it in a shock resistant packaging (electronics including the housing – see 2.21) marked "Handle with care!" or "Sensitive electronic equipment!" to our service address. We will replace the electronics as quickly as possible.

Should the electronic or any other part fail during the warranty period contact us or the respective sales representatives **prior** to recovering the lamp.

2.24 *etalux*® Lighting System in continuous operation (24/7 operation)

We recommend that any installation equipped with the *etalux*® Lighting System operating on a 24h base be switched off at least once a day for a few minutes.

This assures that possible malfunctions can be detected in due time. As some specific kind of tests on the tube can only be run during the start sequence, it is mandatory to interrupt the operation of the *etalux*® Lighting System from time to time; best on a daily base.

2.25 Variation of brightness between different lamps

Different brightness of two or more T5- lamps is typically caused by either the use of lamps of different nominal power rating or respective light colour or different manufacturers. Within a single installation only one single light colour and brand should be chosen.

¹ New bridges can be ordered directly from us as well or via our sales representatives.

3 Installation and safety advice

3.1 To do's prior to installation of the *etalux*® Lighting System ...



- ... shall be installed only by personal with sound knowledge of the location, the technical requirements and this user manual. Each individual location may have its very own requirements in regards to safety regulations and the supplying electric network.
- ... read the complete operation manual and follow the given information carefully.
- ... especially in areas where the lighting system is intended to be installed at an elevated location and a lifting platform or similar must be used due precaution shall be take in regards to falling objects.
- ... turn off the power supply.
- ... the *etalux*® Lighting System is not certified to be used in areas with combustible or easily flammable materials or gases.
- ... for any damage caused by failure to follow the safety instructions, improper handling or use which is not specified in this manual we assume no liability!
- technical specifications, handling notes or any other subject stated in this manual may be changed or updated at any time without prior notice.
- ... to prevent overcompensation of the power factor and to promote the proper operation of the *etalux*® Lighting System potentially already installed compensation systems shall be adjusted or deactivated.
- ... the approved temperature range as outlined in the data sheet must be observed at all times (see 3.6).
- ... the maximum allowed tolerances for any electromagnetic interference (see VDE 0875, EN 55015) must be guaranteed at all times. The *etalux*® Lighting System is rated in Protection Class II. Whenever an electromagnetic ballast rated Protection Class II is used for a lamp rated Protection Class I, an additional radio interference filter (EMI filter) may have to be installed.
- ... due to safety and certification reasons (CE) no modification or alteration of the system is allowed. It is no suitable for children and certainly no toy.
- ... prior to opening the *etalux*® Lighting System all power must be removed.
- ... whenever it is reasonable to assume that a safe operation is no more possible the *etalux*® Lighting System shall be disconnected in a way that any intentional or unintentional use is impossible. Next to other reasons the termination of a safe operation must be assumed in case of:
 - visible damage
 - malfunction
 - prolonged storage under unfavourable conditions

3.2 Contents of delivery

The **etalux**® Lighting System typically consists of two parts:

1. The illuminant itself, the **etalux**®, which bears a UV- resistant, ultra clear sheath tube that encloses a modern high efficiency T5- fluorescent tube. At the tip of this tube rests the electronic ballast enclosed in an IP 54 rated housing. When necessary the light tube (see 2.21) as well as the electronics (see 2.23) may be replaced.



2. A bridge which replaces the conventional or electronic starter. This can be done with the help of a coin, a regular straight screw driver or a ¼" square blade screw driver.



The bridge contains a non- replaceable fuse (Specifications according 3.6 of the data sheet), which protects the electronics and the lamp from undue high current and possibly fatal operational parameters (see 2.22).

WARNING: Never use conventional or electronic starters with the **etalux**® Lighting System!

3.3 Unpacking

Unpack the **etalux**® upon delivery and crosscheck all parts!



All packaging is made of recyclable materials. Please dispose as appropriate.

3.4 Installation of you **etalux**® Lighting System

I. Preparation for the installation

- Shut off and remove all electric supply
- Observe safety regulations applicable to the handling of electronic equipment
- Remove all installed T8- tubes which shall be replaced
- Remove all starters (Picture 1)



Picture 1

II. Installation of the **etalux**® bridge (Picture 2)



Picture 2

Insert the **etalux**® bridge to replace the conventional or electronic starter. This can be done with the help of a coin, a regular straight screw driver or a ¼" square blade screw driver.

III. Installation of the **etalux**® illuminant



Face with label / logo e-Ressource



Place the assembled **etalux**[®] Lighting System just like a T8/T12- fluorescent tube into the lamp holder (see ) and lock it by rotating the system by 90° so that the logo / label faces away from the lighting fixture. (Photo shows **etalux**[®] – reflector 1500.)

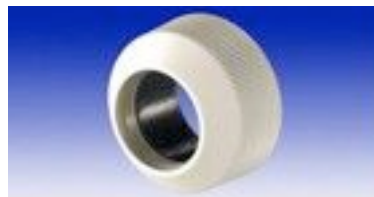
Installation in end-sealed lighting fixtures



Prior to the installation test at a preferably easily accessible light whether the lighting fixture provides sufficient space to accommodate the **etalux[®] Light System. Confirm that the end-caps can be screwed on and still seal well!**

Should you use light fixtures with slotted instead of rotating lamp holders (i.e. when installing the lamp its slides into the lamp holder rather than having to rotate it by 90°) you have to make sure when installing the lamp that the lamp's pin contacts open the lamp's contacts while sliding into the lamp holder.

With an end-sealed light fixture manufactured to accommodate T12- tubes, the screw on end-caps have to be replaced by caps for T8- tubes.¹



(Source: BJB GmbH & Co. KG –www.bjb.com)

- T8- end-caps can be used as installed. T12- end-caps must be replaced to maintain the lamps protection rating (in this case contact us prior installation).
- Slide the cap on the stump which extends outwards from the electronic housing and place both – the **etalux**[®] and the cap – into the light fixture. Screw the cap on lightly. While you do so press the **etalux**[®] closer to the lamp holder. Thereafter slide the opposite cap onto the tube and move the end into the light fixture.
- Rotate the **etalux**[®] Lighting System by 90°, to lock it in and tighten both caps.



Should it not be possible to use the original end-caps, contact us to obtain end-caps which are suitable for the **etalux[®] Lighting System.¹**

¹ Suitable caps may be ordered directly from us **www.e-ressource.eu** or from our sales representatives (see the contacts under www.e-ressource.eu)

IV. Functional check

Simply switch on the power supply. The T5- tube should illuminate within 2 seconds. Remember that new tubes need some burn in time. Darker areas mainly in the middle of the tube typically disappear after some minutes of burning. You may also experience some light waves rolling along inside the tube. This effect is also typical for a new tube or lower temperatures.

3.5 Cleaning

Clean cautiously with a damp or dry soft fabric; eventually use a non-abrasive cleanser like a window cleanser; in particular do not use any thinner or similar chemical. Any failure to do so may constitute a health risk or damage the systems surface.

3.6 Technical data for approved operation (data sheet)

Network power supply

Operating frequency:	approx. 29 kHz
Network voltage:	220 V ~ 240 V (AC/DC)
Network frequency:	50 Hz

<u>Starting time</u>	< 2 sec
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<u>Ballast power consumption (dissipation)</u>	2.8 W
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<u>Reaction upon lamp failure</u>	power cut off etalux 1500 ballast: U-OUT= 330V etalux 1200 ballast: U-OUT= 240V
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<u>Automatic restart after lamp service</u>	yes
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Protection rating and class / EEI

Protection rating:	IP54
Protection class:	II
Energy Efficiency Index (EEI):	A2

Approved temperature

T _c :	70 °C
Approved ambient temperature range:	min. + 0°C max. +50 °C

Scope of operation

Operation with T5 tubes only	a) FH/FHE 28W; length: 1,149 mm b) FH/FHE 35W; length: 1,449 mm
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<u>Fuse (non- replaceable):</u>	250 V, 250 mA
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Dimensions

etalux ® Light System	Ø = 35/45 mm; L= 1,500 resp. 1,200 mm; approx. 380 g (1200) / 420 g (1500) incl. Tube
etalux ® bridge	Ø = 21 mm; L= 30 mm; ca. 5 g

Conformance

Safety:	gem. EN 61347-2-3:2001 +A1:2004 ¹ in conjunction with EN 61347-1:2001
Lamp operation:	EN 60929

¹ The source for these standards are published in the Official Journal of the European Community and implemented in Austria as part of "Bestimmungen für die Elektrotechnik".

Radio interference suppression:	EN 55015: 2006
Harmonic emission:	EN 61000-3-2: 2006
	EN 61000-3-3: 1995 + A1: 2001 + A2: 2005
Electronic and radio shielding:	EN 61547: 1005 + A1:2000

3.7 Disposal and recycling



This product is designed and manufactured for material recycling and re-use. It contains electronic parts which must be disposed as electronic waste. The casing itself as well as the sheath tube are made of recyclable material.

Do not dispose electronic waste along with other household waste. Uncontrolled waste disposal harm the environment and human health! (EEC 2002/96/EC)

3.8 Customer Service

Should despite your proper handling a disruptions occur, or the device was damaged, please contact your dealer or the following addresses:

e-Ressource Deutschland GmbH
Saarstraße 47
D-73230 Kirchheim unter Teck
Phone: +49 (70 21) 73 57 77
UMS-Fax: +49 (7 21) 151 - 53 46 63
service@e-ressource.eu
www.e-ressource.eu

e-Ressource Österreich GmbH
Niederhaus 100
A-6911 Eichenberg
Phone: +43 (55 73) 8 49 81
Fax: +43 (55 73) 8 31 99
service@e-ressource.eu
www.e-ressource.eu

3.9 Warranty policy

Within the statutory warranty period we eliminate free of charge any shortcomings of the device based on materials or workmanship by repair or replacement.

Any operation expressly prohibited in this manual, any adjustments or assembly procedures not recommended or authorized in this manual shall void the warranty.

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